Highlights from an In-Depth Behavioral Survey on Transformative Technologies in Transportation

Sara Khoeini, Denise C. da Silva, and Ram Pendyala
Arizona State University

Critical Issues Subcommittee Meeting, AEP10(1)
Transportation Research Board
January 4th, 2021
Transportation Technologies

- Automation
- Mobility-on-Demand
- Micro-mobility
- Electrification
- Connectivity
Transportation Future?

Increase in VMT, Sprawl and Decrease in Walk, Bike, and Transit Use

Mobility for All and Sustainability

Automation

Mobility-on-Demand

Connectivity

Increase in VMT, Sprawl and Decrease in Walk, Bike, and Transit Use

Mobility for All and Sustainability
Study Purpose

Collect a rich set of data across multiple jurisdictions that collects people’s travel behavior, attitudes, socioeconomics, perceptions and potential behavior in response to Mobility-on-demand and Autonomous Vehicles.
TOMNET: Teaching Old Models NEW Tricks

MISSION: To bring attitudinal information into real-world transportation planning and forecasting

• A Tier 1 University Transportation Center
• Authorized November 2016
• 5-year funding
TOMNET Transformative Transportation Technologies (T4) Survey

- Phoenix, Atlanta, Austin, and Tampa metro areas
- Summer and Fall 2019 (pre-pandemic)
- Random address-based sample with online instrument
- Comprehensive attitudinal survey on MoD and AV
- Weighted to better represent Census distributions

<table>
<thead>
<tr>
<th></th>
<th>Phoenix, AZ</th>
<th>Atlanta, GA</th>
<th>Austin, TX</th>
<th>Tampa, FL</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>1,027</td>
<td>944</td>
<td>1,127</td>
<td>260</td>
<td>3,358</td>
</tr>
<tr>
<td>%</td>
<td>30.6%</td>
<td>28.1%</td>
<td>33.6%</td>
<td>7.8%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Mobility on Demand

Ridehailing and Micromobility

Picture source: https://www.facebook.com/mobilityondemand/
MoD Familiarity and Usage (N=3,358)

- **Private ridehailing (e.g., Uber, Lyft)**:
  - Familiar but not an user: 11%
  - Not familiar: 34%
  - Use it rarely: 26%
  - Use it monthly: 54%
  - Use it weekly: 39%

- **Shared ridehailing (e.g., uberPOOL, Lyft Share)**:
  - Familiar but not an user: 5%
  - Not familiar: 14%
  - Use it rarely: 4%
  - Use it monthly: 55%
  - Use it weekly: 5%

- **Carsharing (e.g., Zipcar, Share Now)**:
  - Familiar but not an user: 4%
  - Not familiar: 42%
  - Use it rarely: 38%
  - Use it monthly: 52%
  - Use it weekly: 61%

- **Bikesharing (e.g., Jump, Grid)**:
  - Familiar but not an user: 8%
  - Not familiar: 28%
Last Ridehailing Trips Attributes (N=1,885)

- 54% waited less than 5 min
- Average travel time 21 min
- 47% weekday daytime
- 25% weekend nighttime,
- Top trip purposes:
  - Social/recreational 25%
  - Main commute location 15%
  - To access airport 14%

Alternative mode:
- Taxi 21%
- Drive alone 18%
- Drive with passengers 14%
- Bus 11%
- Ride with others 12%
- I would not have made the trip, 10%
- Other, 6%
- Walk, 4%
- Light rail, 2%
- Personal bicycle or scooter, 2%
- Drive with passengers, 14%
- Bus, 11%
- Ride with others, 12%
- I would not have made the trip, 10%
- Other, 6%
- Walk, 4%
- Light rail, 2%
- Personal bicycle or scooter, 2%
## Ridehailing Impacts

**Only monthly and weekly users**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Neutral</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ridehailing services allow me to live with fewer or no cars. (N=508)</td>
<td>20%</td>
<td>18%</td>
<td>27%</td>
<td>22%</td>
<td>14%</td>
</tr>
<tr>
<td>Ridehailing service availability affects where I choose to live, work, and/or go to school. (N=503)</td>
<td>45%</td>
<td>14%</td>
<td>23%</td>
<td>11%</td>
<td>6%</td>
</tr>
<tr>
<td>Ridehailing services help me get to/from public transit stops. (N=510)</td>
<td>17%</td>
<td>11%</td>
<td>34%</td>
<td>18%</td>
<td>19%</td>
</tr>
</tbody>
</table>

*TOMNET Transportation Center  
Teaching Old Models New Tricks*
Ridehailing: Willingness to Share

Last actual ridehailing trips* (N=1,219)

- 12% chose to share
- Low income chose to share twice more than high income
- Women chose to share 1.5 times more than men
- Frequent users chose to share 1.4 times more than infrequent users

*Shared ridehailing only for Austin and Atlanta
Micromobility Trips (N=380 users)

- 76% used e-scooter service
- 62% of trips were between 1 to 2 mi
- 38% weekday during daytime
- Top trip purposes:
  - 22% to commute location
  - 19% for shopping and errands
  - 7% just to enjoy the new service
Autonomous Vehicles

Attitudes and Travel Behavior
Autonomous Vehicles (N=3,356)

**FAMILIARITY**
- Never heard before survey: 15%
- Heard of AVs, but don't know much about: 36%
- Somewhat familiar: 35%
- Very familiar: 13%
- Actually taken a ride in an AV: 1%

**WILLINGNESS TO BUY**
- Eventually buy: 57%
- Never buy: 38%
- One of the first to buy: 5%
Autonomous Vehicles: Safety and Sharing Perceptions

- I am concerned about the potential failure of AV sensors, equipment, technology, or programs. (N=3331)
  - Strongly disagree: 6%
  - Somewhat disagree: 8%
  - Neutral: 17%
  - Somewhat agree: 35%
  - Strongly agree: 33%

- I want the ability to take control of the AV at any time during the ride. (N=3331)
  - Strongly disagree: 6%
  - Somewhat disagree: 18%
  - Neutral: 33%
  - Somewhat agree: 40%

- I will use AV ridehailing services alone or with coworkers, friends, or family. (N=3358)
  - Strongly disagree: 19%
  - Somewhat disagree: 10%
  - Neutral: 25%
  - Somewhat agree: 32%
  - Strongly agree: 14%

- I will use AV ridehailing services with other passengers I don't know. (N=3358)
  - Strongly disagree: 29%
  - Somewhat disagree: 23%
  - Neutral: 27%
  - Somewhat agree: 15%
  - Strongly agree: 5%
Commute Time Changes with AV (N=2,221)

How much longer would you be willing to commute in an AV (compared to your current commute)?

- Up to 5 additional minutes: 21%
- 5 to 15 additional minutes: 15%
- 15 to 30 additional minutes: 14%
- More than 30 additional minutes: 6%
- Not accept a longer commute: 31%
## Autonomous Vehicles: Travel Impacts
*(N=3,358)*

<table>
<thead>
<tr>
<th></th>
<th>Very likely</th>
<th>Somewhat likely</th>
<th>Neutral</th>
<th>Somewhat unlikely</th>
<th>Very unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making additional trips that are not made now</td>
<td>8%</td>
<td>19%</td>
<td>26%</td>
<td>21%</td>
<td>27%</td>
</tr>
<tr>
<td>Moving to a better location or home</td>
<td>7%</td>
<td>12%</td>
<td>30%</td>
<td>18%</td>
<td>33%</td>
</tr>
<tr>
<td>Making more long-distance road trips</td>
<td>14%</td>
<td>25%</td>
<td>22%</td>
<td>16%</td>
<td>21%</td>
</tr>
<tr>
<td>Traveling more in peak hours (due to multitasking)</td>
<td>13%</td>
<td>25%</td>
<td>25%</td>
<td>17%</td>
<td>20%</td>
</tr>
</tbody>
</table>
Autonomous Vehicles Regulations

- Laws should be passed to require AVs to travel at 25 mph or less on city streets. (32% Disagree, 34% Neutral, 34% Agree)
- AVs should prioritize the safety of pedestrians and bicyclists on the road over that of passengers in the vehicle. (24% Disagree, 33% Neutral, 42% Agree)
- AVs should be allowed on the market only when they prove to be at least as safe as human drivers. (10% Disagree, 11% Neutral, 79% Agree)
# How AVs Shape the Future of Mobility?

**N=3,356**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would feel comfortable having an AV pick-up/drop-off children without adult supervision.</td>
<td>62%</td>
<td>21%</td>
<td>18%</td>
</tr>
<tr>
<td>I would send an AV to pick-up groceries/laundry/food orders by itself.</td>
<td>28%</td>
<td>23%</td>
<td>49%</td>
</tr>
<tr>
<td>AVs would save me time and money for parking by dropping me off and parking themselves.</td>
<td>16%</td>
<td>31%</td>
<td>53%</td>
</tr>
</tbody>
</table>

Photo: Brian Tietz for Transdev
Photo: Ross D. Franklin, STF / Associated Press

TOMNET Transportation Center
Teaching Old Models New Tricks

ASU Ira A. Fulton Schools of Engineering
Arizona State University
### Role of Age and Gender

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Ride AV</th>
<th>Neutral</th>
<th>Never ride an AV</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-30 years</td>
<td>55%</td>
<td>33%</td>
<td>12%</td>
</tr>
<tr>
<td>31-40 years</td>
<td>57%</td>
<td>23%</td>
<td>20%</td>
</tr>
<tr>
<td>41-50 years</td>
<td>56%</td>
<td>29%</td>
<td>15%</td>
</tr>
<tr>
<td>51-60 years</td>
<td>40%</td>
<td>33%</td>
<td>26%</td>
</tr>
<tr>
<td>61-70 years</td>
<td>40%</td>
<td>39%</td>
<td>21%</td>
</tr>
<tr>
<td>71+ years</td>
<td>42%</td>
<td>25%</td>
<td>33%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Never ride an AV</th>
<th>Neutral</th>
<th>Ride AV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (N=1619)</td>
<td>15%</td>
<td>26%</td>
<td>59%</td>
</tr>
<tr>
<td>Female (N=1712)</td>
<td>24%</td>
<td>34%</td>
<td>59%</td>
</tr>
</tbody>
</table>
Role of Education in AV Familiarity

- Completed graduate degree(s): 36% Not Familiar, 64% Familiar
- Bachelor's degree(s) or some graduate school: 44% Not Familiar, 56% Familiar
- Some college or technical school: 49% Not Familiar, 51% Familiar
- Completed high school or GED: 61% Not Familiar, 39% Familiar
- Some grade/high school: 79% Not Familiar, 21% Familiar
Learning how to use new technologies is frustrating: 
Disagree = Tech-savvy, Neutral or agree= Not tech-savvy
We found:
• Role of attitudes in travel choices is substantial
• Remarkable consistency between geographic areas
• Ridehailing is under use by 16% at least monthly
• 38% indicated to never buy AVs (safety concerns)
• Sustainability and equity of MoD and AVs need attention

We recommend:
• Integrated mobility platforms
• Transit-MoD partnerships
• Regulations toward environment
• Cost competitiveness of sharing vs private modes
Thank you!

Sara Khoeini, sara.khoeini@asu.edu

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